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AGRICULTURAL MEMORANDUM NO 950

Design Temperatures for Insulated Stores

J Cochrane

Introduction

Design temperatures - those air temperatures which are exceeded on 2% or 5% of occasions - for both hot and cold stores, are estimated for some 42 meteorological stations in eastern England.

Method

Shellard and Sarson (1962) showed that the frequency distribution of hourly temperatures could be estimated for sites at which only maximum and minimum temperatures were recorded from the distribution of the dimensionless parameter K when

$$K = \frac{(T - Tm)}{(Tx - Tn)}$$

Where Tx and Tn are the average mean daily maximum and minimum temperatures for the month, Tm is the average mean daily temperature, assumed to be $\frac{1}{2}$ (Tx + Tn), and T is the temperature exceeded by the amount K, ie the design temperature. The 2%, 5%, 95% and 98% values of K may be taken from the curves presented by Shellard and Sarson and the design temperature is then given by

$$T = Tm + K\,(Tx - Tn)$$

Values of K may not be read precisely from the published diagrams; the values actually used in the calculation are:-

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2%	1.55	1.30	1.10	0.95	1.05	1.05	0.95	0.90	0.90	1.00	1.20	1.50
5%	1.35	1.15	0.85	0.70	0.80	0.75	0.75	0.70	0.70	0.85	1.05	1.30
95%	-1.40	-1.25	-0.95	-0.75	-0.75	-0.70	-0.65	-0.70	-0.85	-1.10	-1.30	-1.40
98%	-1.75	-1.60	-1.25	-0.90	-0.90	-0.80	-0.80	-0.80	-1.15	-1.40	-1.65	-1.80

Design temperatures for heating and cooling at 42 meteorological stations in eastern England are tabulated in Appendix I. They are based on published temperature averages for 1941-70 (Meteorological Office 1976; Laing 1976).

Station details and period of record used are shown in Appendix II and station locations are shown in the maps - Figures 1 and 2.

Discussion

It must be remembered that the stations used represent a mixture of airfield sites which are flat and open and others which are subject to variable degrees of shelter, urban effect, coastal influence and "frost proneness". Due consideration should be given to these various factors which influence temperatures before deciding on the design temperature appropriate to a particular site.

Any comments or criticisms should be addressed to the author.

August 1982

Meteorological Office
ADAS
Cambridge

References

Shellard, H C & Sarson, P B, "Estimation of frequency distribution of hourly temperatures at United Kingdom stations from monthly averages of daily maxima and minima". Meteorological Magazine, 91, (1962), 19 - 26.

London, Meteorological Office, "Averages of temperature for the United Kingdom, 1941-70". London, 1976.

Laing, J, "Averages of temperature 1941-70 for short period stations in the United Kingdom". Meteorological Office Climatological Memorandum 78, 1976.

CROMER
WEST RAYNHAM
TERRINGTON ST. CLEMENT
MARHAM
SPROWSTON
BURLINGHAM
WITTERING
SANTON DOWNHAM
GORLESTON
LOWESTOFT
WILDENHALL
WYTON
BOXWORTH
CAMBRIDGE
WATTISHAM
CARDINGTON
WOBURN
SILSOE
EAST BERGHOLT
DOVERCOURT
STANSTED
HODDESDON
LITTLE PARNDON
ROTHAMSTED
CLACTON-ON-SEA
WRITTLE
ST. ALBANS
GARSTON
SHOEBURYNESS
SOUTHEND

FIGURE 1

KINGSTON-UPON-HULL
CLEETHORPES
MANBY
LINCOLN
WADDINGTON
SKEGNESS
CRANWELL
NOTTINGHAM
SUTTON BONINGTON
WITTERING
RAUNDS

FIGURE 2

APPENDIX I

Values of heating and cooling design temperatures in eastern England (°C)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Boxworth													
Heating	2%	-6.1	-6.8	-4.8	-0.1	2.2	6.2	8.3	8.3	3.8	-0.1	-3.7	-6.0
	5%	-4.2	-4.6	-2.3	1.4	3.8	7.2	9.8	9.2	6.5	2.2	-1.6	-3.7
Cooling	2%	12.0	11.5	14.7	17.5	22.1	25.6	25.7	24.9	22.4	18.6	13.7	12.5
	5%	10.9	10.5	12.6	15.2	19.6	22.4	23.7	23.0	20.6	17.4	12.8	11.4
Burlingham													
Heating	2%	-5.5	-.52	-3.3	1.1	3.4	7.2	9.1	8.9	5.0	1.2	-2.5	-5.1
	5%	-3.8	-3.4	-1.3	2.3	4.7	8.1	10.4	9.8	7.4	3.3	-0.6	-3.0
Cooling	2%	10.7	10.4	12.9	15.9	20.5	24.1	24.4	23.7	21.6	18.2	13.4	12.1
	5%	9.7	9.6	11.2	13.9	18.3	21.3	22.6	22.0	20.0	17.1	12.6	11.1
Cambridge, Botanic Gardens													
Heating	2%	-6.6	-6.5	-4.7	0.2	2.5	6.5	8.7	8.4	3.6	-0.7	-4.2	-6.2
	5%	-4.6	-4.3	-2.2	1.6	4.0	7.6	10.2	9.4	6.4	1.8	-2.0	-3.9
Cooling	2%	11.9	12.0	15.3	18.1	22.9	26.3	26.2	25.4	22.9	19.2	14.3	12.9
	5%	10.8	11.1	13.1	15.7	20.3	23.1	24.2	23.4	21.0	18.0	13.3	11.7
Cardington													
Heating	2%	-5.8	-5.8	-5.1	-0.4	1.7	5.7	7.9	7.5	2.7	-1.4	-3.4	-4.9
	5%	-4.0	-3.7	-2.5	1.1	3.3	6.8	9.5	8.6	5.7	1.2	-1.3	-2.9
Cooling	2%	11.0	11.3	15.2	17.9	22.7	26.1	26.3	25.4	22.8	19.0	13.7	11.9
	5%	10.0	10.4	13.0	15.4	20.0	22.8	24.2	23.3	20.9	17.7	12.8	10.9
Clacton-on-Sea													
Heating	2%	-4.4	-3.8	-1.4	2.7	5.5	9.3	11.2	11.4	7.7	4.0	-0.6	-3.0
	5%	-2.9	-2.2	0.3	3.7	6.5	10.0	12.3	12.1	9.7	5.6	1.1	-1.3
Cooling	2%	10.1	9.8	11.6	14.6	18.5	22.5	23.6	23.1	20.9	17.4	13.1	11.5
	5%	9.2	9.1	10.2	13.0	16.9	20.2	22.2	21.7	19.6	16.6	12.3	10.6
Cleethorpes													
Heating	2%	-5.1	-4.8	-2.2	1.6	5.2	8.0	9.8	9.9	8.2	1.9	-2.0	-4.3
	5%	-3.4	-2.9	-0.3	2.7	6.0	8.7	10.9	10.7	9.8	3.9	-0.2	-2.4
Cooling	2%	11.1	10.6	12.6	15.6	18.6	22.4	23.4	22.7	19.1	17.3	13.1	11.9
	5%	10.1	9.8	11.1	13.7	16.4	20.1	21.9	21.2	18.0	16.3	12.3	10.9
Cranwell													
Heating	2%	-6.2	-6.3	-4.1	0.3	2.5	6.5	8.6	8.6	4.1	0.0	-3.5	-5.6
	5%	-4.4	-4.3	-1.8	1.6	4.0	7.5	10.0	9.5	6.7	2.3	-1.4	-3.5
Cooling	2%	10.6	10.8	13.5	16.4	21.1	24.5	24.5	23.7	21.4	17.8	13.1	11.9
	5%	9.6	9.9	11.7	14.2	18.7	21.6	22.7	21.9	19.7	16.7	12.2	10.8
Cromer													
Heating	2%	-5.4	-5.0	-2.4	1.7	4.2	7.9	9.7	9.8	6.6	2.6	-1.6	-4.5
	5%	-3.6	-3.2	-0.5	2.8	5.3	8.6	10.9	10.6	8.6	4.5	0.2	-2.4
Cooling	2%	11.2	10.6	12.4	15.2	19.2	22.3	23.2	22.7	20.7	17.5	13.2	12.4
	5%	10.2	9.8	10.9	13.4	17.3	20.0	21.7	21.2	19.3	16.6	12.5	11.3

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dovercourt													
Heating	2%	-5.9	-5.4	-3.4	1.3	3.8	7.8	9.9	9.8	5.7	1.3	-2.7	-5.2
	5%	-4.1	-3.4	-1.3	2.5	5.1	8.6	11.1	10.6	8.0	3.4	-0.6	-3.1
Cooling	2%	11.3	10.9	13.1	16.0	20.0	23.3	24.4	23.9	21.5	18.4	13.9	12.6
	5%	10.2	10.0	11.4	14.0	17.9	20.8	22.7	22.3	19.9	17.3	13.0	11.5
Earls Colne													
Heating	2%	-6.7	-6.3	-4.2	0.2	2.3	6.3	8.6	8.4	3.7	-0.5	-4.0	-6.2
	5%	-4.7	-4.1	-1.8	1.6	3.8	7.4	10.1	9.4	6.5	2.0	-1.7	-3.9
Cooling	2%	11.8	11.4	14.6	17.7	22.7	26.1	26.3	25.6	23.0	19.2	14.3	12.9
	5%	10.7	10.5	12.6	15.4	20.1	22.9	24.3	23.6	21.1	18.0	13.3	11.7
East Bergholt													
Heating	2%	-6.9	-6.3	-4.7	-0.1	1.8	5.8	8.1	8.0	3.2	-1.4	-4.9	-6.5
	5%	-4.9	-4.2	-2.2	1.4	3.5	7.0	9.7	9.0	6.1	1.2	-2.5	-4.2
Cooling	2%	11.9	11.7	14.8	17.9	23.1	26.6	26.8	25.8	23.1	19.7	14.8	13.0
	5%	10.8	10.7	12.7	15.4	20.4	23.2	24.7	23.7	21.1	18.4	13.7	11.8
Garston													
Heating	2%	-6.7	-6.6	-4.6	0.2	2.4	6.5	8.8	8.5	3.9	-0.4	-3.9	-6.3
	5%	-4.7	-4.4	-2.1	1.7	4.0	7.6	10.3	9.5	6.6	2.0	-1.7	-4.0
Cooling	2%	11.8	11.7	14.9	17.6	22.3	25.4	25.6	24.7	22.2	18.6	14.1	12.8
	5%	10.7	10.7	12.8	15.3	19.8	22.4	23.7	22.8	20.4	17.4	13.1	11.6
Gorleston													
Heating	2%	-2.8	-3.0	-0.9	3.2	5.9	9.2	11.1	11.2	7.8	4.4	0.4	-1.9
	5%	-1.5	-1.5	0.7	4.0	6.7	9.8	12.1	11.9	9.6	6.0	1.9	-0.4
Cooling	2%	9.4	9.5	10.9	13.3	16.8	20.5	22.0	21.8	20.1	16.9	12.7	11.0
	5%	8.7	8.8	9.7	12.0	15.4	18.7	20.8	20.5	18.9	16.1	12.0	10.2
Hoddesdon													
Heating	2%	-7.0	-6.4	-4.6	0.0	2.6	6.5	8.7	8.4	3.7	-0.9	-4.6	-6.3
	5%	-4.9	-4.2	-2.1	1.5	4.2	7.6	10.2	9.4	6.5	1.7	-2.2	-4.0
Cooling	2%	12.2	11.9	14.9	18.0	22.5	26.3	26.2	25.4	23.0	19.3	14.5	13.2
	5%	11.0	10.9	12.8	15.5	20.0	23.1	24.2	23.4	21.1	18.0	13.5	12.0
Kingston-upon-Hull													
Heating	2%	-4.6	-4.7	-2.7	2.3	3.8	7.6	9.7	9.6	5.6	1.5	-1.7	-4.1
	5%	-2.9	-2.9	-0.7	3.3	5.1	8.4	10.9	10.4	7.8	3.5	0.1	-2.2
Cooling	2%	10.6	10.9	13.1	14.7	20.2	23.8	24.2	23.4	21.1	17.8	12.8	11.7
	5%	9.7	10.1	11.4	13.0	18.1	21.2	22.5	21.8	19.6	16.8	12.1	10.7
Lincoln													
Heating	2%	-7.1	-6.8	-4.6	-0.3	2.0	5.9	7.1	7.9	5.1	-0.8	-4.3	-6.6
	5%	-5.1	-4.6	-2.2	1.1	3.5	6.9	8.6	8.9	7.9	1.6	-2.1	-4.3
Cooling	2%	11.4	11.5	14.4	17.4	21.7	25.1	24.1	24.4	24.0	18.6	13.7	12.3
	5%	10.3	10.5	12.4	15.0	19.2	22.0	22.2	22.5	22.1	17.4	12.7	11.1

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Little Parndon													
Heating	2%	-7.2	-6.6	-5.1	-0.5	1.8	5.8	8.1	7.9	2.9	-1.3	-4.5	-7.1
	5%	-5.2	-4.4	-2.5	1.0	3.4	6.9	9.6	9.4	5.9	1.2	-2.2	-4.6
Cooling	2%	12.2	11.9	15.2	18.0	22.8	26.2	26.3	25.4	23.0	19.3	14.3	13.4
	5%	11.1	11.0	13.0	15.5	20.1	22.9	24.2	23.3	21.1	18.0	13.3	12.2
Lowestoft													
Heating	2%	-5.1	-4.7	-2.5	1.8	4.5	8.1	10.0	10.1	6.3	2.5	-1.6	-4.1
	5%	-3.4	-2.9	-0.6	2.9	5.6	8.9	11.1	10.9	8.5	4.5	0.2	-2.2
Cooling	2%	10.7	10.4	12.1	14.8	18.6	22.2	23.6	22.9	21.3	17.9	13.5	12.1
	5%	9.8	9.6	10.6	13.0	16.8	19.9	22.1	21.4	19.8	16.9	12.7	11.1
Maldon													
Heating	2%	-6.2	-5.9	-3.8	0.7	3.2	7.1	9.3	9.2	4.6	0.0	-3.7	-6.0
	5%	-4.3	-3.8	-1.5	2.0	4.6	8.1	10.7	10.1	7.2	2.4	-1.5	-3.7
Cooling	2%	11.7	11.5	14.1	17.2	21.9	25.6	25.9	25.2	22.6	19.0	14.3	13.1
	5%	10.6	10.6	12.2	14.9	19.5	22.6	24.0	23.3	20.9	17.8	13.3	11.9
Manby													
Heating	2%	-4.4	-5.3	-3.5	0.6	2.8	6.5	8.7	8.5	4.4	0.8	-2.0	-3.6
	5%	-2.9	-3.4	-1.4	1.8	4.1	7.4	10.0	9.4	6.8	2.9	-0.2	-1.9
Cooling	2%	10.1	10.7	13.0	15.6	19.5	23.2	23.6	23.0	21.2	17.8	12.8	10.9
	5%	9.2	9.8	11.3	13.6	17.4	20.5	21.9	21.3	19.5	16.7	12.1	10.0
Marham													
Heating	2%	-5.6	-6.0	-4.4	0.3	2.7	6.8	8.7	8.6	3.6	-0.1	-3.2	-5.6
	5%	-3.9	-4.0	-2.0	1.7	4.1	7.8	10.1	9.6	6.4	2.2	-1.1	-3.5
Cooling	2%	10.2	10.8	14.6	17.1	21.4	25.1	25.3	24.3	22.3	18.6	13.4	12.2
	5%	9.3	10.0	12.6	14.9	19.0	22.1	23.4	22.4	20.5	17.4	12.5	11.1
Mildenhall													
Heating	2%	-4.8	-5.1	-3.6	0.7	3.0	7.0	9.1	8.7	4.3	0.5	-2.4	-3.8
	5%	-3.1	-3.1	-1.3	2.1	4.5	8.0	10.5	9.7	6.9	2.7	-0.5	-2.0
Cooling	2%	10.4	11.2	14.3	17.5	22.3	25.3	25.7	25.2	22.5	18.7	13.3	11.1
	5%	9.5	10.3	12.4	15.3	19.8	22.3	23.8	23.3	20.7	17.6	12.5	10.2
Nottingham													
Heating	2%	-4.1	-5.1	-3.0	1.5	3.8	7.9	9.9	9.5	5.1	0.8	-2.2	-4.9
	5%	-2.6	-3.2	-0.9	2.7	5.1	8.7	11.1	10.3	7.5	2.9	-0.3	-2.8
Cooling	2%	9.8	10.9	13.5	15.9	20.9	24.1	24.4	23.6	21.1	17.8	13.2	12.3
	5%	9.0	10.0	11.8	14.0	18.7	21.5	22.7	21.9	19.6	16.7	12.4	11.3
Raunds													
Heating	2%	-7.1	-7.1	-5.4	-0.9	1.8	5.8	7.9	7.7	2.7	-1.6	-4.5	-6.6
	5%	-5.1	-4.8	-2.8	0.7	3.4	6.9	9.5	8.7	5.7	1.0	-2.2	-4.3
Cooling	2%	11.4	11.8	15.1	18.0	22.8	26.4	26.3	25.4	22.6	18.8	13.8	12.5
	5%	10.3	10.8	12.9	15.4	20.1	23.0	24.2	23.3	20.7	17.5	12.8	11.3

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rothamsted													
Heating	2%	-6.6	-6.3	-4.6	0.1	2.4	6.2	8.3	8.3	3.9	-0.1	-3.8	-6.2
	5%	-4.7	-4.3	-2.2	1.5	3.9	7.2	9.7	9.2	6.5	2.2	-1.8	-4.0
Cooling	2%	10.9	10.5	13.8	16.8	21.5	24.7	24.9	24.1	21.4	17.7	13.0	12.0
	5%	9.9	9.7	11.8	14.5	19.0	21.7	23.0	22.2	19.7	16.6	11.9	10.9
St Albans													
Heating	2%	-7.3	-6.6	-4.8	-0.1	2.2	6.3	8.4	8.1	3.7	-0.7	-4.1	-6.7
	5%	-5.2	-4.5	-2.3	1.4	3.7	7.3	9.9	9.0	6.4	1.7	-1.9	-4.4
Cooling	2%	11.9	11.4	14.5	17.3	21.9	25.3	25.7	24.7	22.1	18.5	13.9	12.8
	5%	10.7	10.4	12.5	15.0	19.4	22.2	23.7	22.8	20.3	17.3	12.9	11.6
Santon Downham													
Heating	2%	-9.1	-8.9	-7.4	-2.5	-0.2	4.3	6.9	6.3	0.3	-4.3	-7.0	-10.2
	5%	-6.7	-6.3	-4.4	-0.8	1.7	5.5	8.6	7.4	3.7	-1.2	-4.2	-7.1
Cooling	2%	12.7	12.9	16.1	18.9	23.8	27.2	28.6	25.7	23.7	20.2	15.3	15.3
	5%	11.4	11.7	13.6	16.0	20.7	23.5	24.4	23.4	21.4	18.7	14.1	13.7
Shoeburyness													
Heating	2%	-2.9	-3.5	-2.0	2.2	4.8	8.5	10.8	10.9	6.7	3.1	-0.3	-1.9
	5%	-1.6	-1.8	-0.1	3.3	6.0	9.3	12.0	11.7	8.9	5.0	1.4	-0.4
Cooling	2%	9.9	10.4	13.0	16.0	20.2	24.0	24.6	24.0	21.7	18.0	13.1	11.0
	5%	9.2	9.7	11.4	14.2	18.2	21.5	23.0	22.5	20.2	17.1	12.4	10.2
Silsoe													
Heating	2%	-6.5	-6.5	-4.7	0.0	2.2	6.3	8.5	8.0	3.6	-0.6	-3.8	-6.0
	5%	-4.6	-4.3	-2.2	1.5	3.7	7.3	10.0	9.0	6.4	1.8	-1.6	-3.7
Cooling	2%	11.6	11.2	14.6	17.4	21.9	25.3	25.5	24.8	22.3	18.4	13.6	12.5
	5%	10.5	10.3	12.6	15.1	19.4	22.2	23.6	22.8	20.5	17.2	12.7	11.4
Skegness													
Heating	2%	-5.2	-5.0	-2.3	1.8	4.5	8.1	10.0	9.9	6.2	2.6	-2.0	-4.6
	5%	-3.5	-3.1	-0.5	2.9	5.6	8.8	11.1	10.6	8.2	4.4	-0.2	-2.6
Cooling	2%	10.6	10.4	12.0	14.8	18.2	21.8	22.9	22.3	20.3	17.0	13.1	11.9
	5%	9.7	9.6	10.5	13.0	16.4	19.6	21.5	20.8	18.9	16.1	12.3	10.9
Southend													
Heating	2%	-5.1	-4.7	-2.5	2.0	4.8	8.4	10.7	10.7	6.2	2.6	-1.6	-4.2
	5%	-3.4	-2.8	-0.4	3.2	6.1	9.3	12.0	11.5	8.6	4.6	0.3	-2.2
Cooling	2%	11.1	11.3	14.0	17.0	21.5	25.3	26.1	25.1	22.8	18.7	13.8	12.3
	5%	10.1	10.4	12.3	15.0	19.4	22.5	24.3	23.4	21.2	17.6	13.0	11.3
Sprowston													
Heating	2%	-6.7	-5.9	-4.0	0.9	3.0	7.1	9.2	9.2	4.6	0.3	-3.3	-5.9
	5%	-4.7	-3.8	-1.6	2.2	4.5	8.1	10.7	10.2	7.4	2.7	-1.1	-3.6
Cooling	2%	11.8	11.5	14.6	17.4	22.3	26.1	26.9	26.0	23.5	19.5	14.7	13.2
	5%	10.7	10.6	12.6	15.1	19.8	23.0	24.9	24.0	21.6	18.3	13.7	12.0

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stansted													
Heating	2%	-5.3	-5.7	-4.3	0.2	2.6	6.8	8.8	8.7	4.4	0.2	-2.9	-4.7
	5%	-3.6	-3.8	-2.0	1.6	4.0	7.7	10.2	9.7	7.0	2.5	-1.0	-2.8
Cooling	2%	9.9	10.3	13.8	16.9	21.5	24.9	25.2	24.4	21.7	18.0	13.0	11.1
	5%	9.0	9.4	11.8	14.6	19.1	22.0	23.4	22.5	20.0	16.9	12.2	10.1
Sutton Bonington													
Heating	2%	-7.1	-6.5	-4.4	0.1	2.1	6.0	8.3	7.7	3.3	-0.8	-4.0	-6.5
	5%	-5.1	-4.4	-2.0	1.5	3.6	7.1	9.7	8.7	5.9	1.6	-1.9	-4.2
Cooling	2%	11.7	11.5	14.2	16.9	21.6	24.9	24.9	24.2	21.5	18.2	13.6	13.0
	5%	10.6	10.5	13.2	14.7	19.1	21.9	23.0	22.3	19.7	17.0	12.7	11.8
Terrington St Clement													
Heating	2%	-6.0	-6.1	-4.2	0.4	2.7	6.4	8.6	8.4	3.8	-0.2	-3.6	-6.2
	5%	-4.2	-4.1	-1.8	1.8	4.1	7.4	10.0	9.3	6.5	2.1	-1.5	-3.9
Cooling	2%	10.8	11.0	14.2	17.1	21.4	24.7	25.0	24.4	22.2	18.5	13.5	12.9
	5%	9.8	10.1	12.2	14.8	19.0	21.7	23.2	22.5	20.4	17.3	12.6	11.7
Waddington													
Heating	2%	-4.3	-5.0	-3.6	0.8	2.9	6.9	8.9	8.7	4.6	1.0	-1.7	-3.5
	5%	-2.8	-3.2	-1.4	2.1	4.3	7.8	10.3	9.6	7.0	3.0	0.0	-1.8
Cooling	2%	9.3	10.1	13.3	16.2	20.7	24.1	24.2	23.5	21.0	17.3	12.0	10.1
	5%	8.4	9.3	11.5	14.1	18.4	21.3	22.4	21.8	19.4	16.3	11.2	9.2
Wattisham													
Heating	2%	-4.5	-5.1	-3.8	0.2	2.6	6.5	8.7	8.8	5.0	0.8	-1.6	-3.6
	5%	-3.0	-3.3	-1.7	1.5	4.0	7.4	10.1	9.7	7.4	2.9	0.1	-2.0
Cooling	2%	9.1	9.7	13.0	16.3	21.1	24.6	24.8	24.0	21.2	17.4	12.1	9.9
	5%	8.2	9.0	11.2	14.1	18.8	21.7	23.0	22.2	19.6	16.4	11.3	9.1
West Raynham													
Heating	2%	-4.1	-4.7	-3.5	1.0	3.2	6.8	8.9	8.6	4.5	1.0	-1.6	-3.5
	5%	-2.8	-3.0	-1.5	2.2	4.5	7.7	10.2	9.5	6.9	3.0	0.1	-1.8
Cooling	2%	8.7	9.5	12.7	15.6	19.9	23.5	24.0	23.2	20.9	17.3	12.1	10.1
	5%	8.0	8.7	11.0	13.6	17.8	20.8	22.3	21.5	19.3	16.3	11.3	9.2
Wittering													
Heating	2%	-5.1	-5.2	-3.9	0.1	2.7	6.7	8.7	8.4	4.2	0.4	-2.3	-3.8
	5%	-3.4	-3.3	-1.7	1.5	4.1	7.7	10.1	9.4	6.8	2.6	-0.5	-2.1
Cooling	2%	10.1	10.2	13.7	16.8	21.4	24.6	25.0	24.1	21.5	17.7	12.5	10.7
	5%	9.2	9.4	11.8	14.5	19.0	21.7	23.1	22.2	19.8	16.6	11.8	9.8
Woburn													
Heating	2%	-6.6	-6.1	-4.6	0.1	2.4	6.3	8.3	8.2	3.7	-0.3	-3.7	-6.0
	5%	-4.7	-4.1	-2.2	1.5	3.9	7.3	9.8	9.1	6.3	1.9	-1.6	-3.8
Cooling	2%	11.3	11.1	14.0	16.9	21.5	24.8	25.1	24.2	21.5	17.9	13.4	12.2
	5%	10.2	10.1	12.0	14.7	19.0	21.8	23.2	22.3	19.8	16.8	12.5	11.1

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						Writtle							
Heating	2%	-6.6	-6.3	-4.7	-0.2	2.1	5.9	8.3	7.9	3.4	1.7	-4.2	-6.1
	5%	-4.4	-4.2	-2.2	1.3	3.7	7.0	9.4	8.9	6.2	3.7	-2.0	-3.8
Cooling	2%	11.9	11.7	14.8	17.9	22.7	26.3	26.2	25.6	22.7	17.1	14.3	13.0
	5%	10.8	10.7	12.8	15.5	20.1	23.0	24.2	23.5	20.8	16.1	13.3	11.8
						Wyton							
Heating	2%	-4.5	-5.6	-4.3	0.5	3.1	7.0	9.1	8.8	4.5	0.7	-2.0	-3.6
	5%	-3.0	-3.6	-1.9	1.8	4.5	8.0	10.5	9.8	7.1	2.9	-0.2	-1.9
Cooling	2%	10.0	10.9	14.5	17.3	21.8	24.9	25.2	24.5	22.0	18.2	12.8	10.6
	5%	9.1	10.1	12.5	15.0	19.4	22.0	23.4	22.6	20.3	17.1	12.1	9.7

APPENDIX II

Station	Altitude (M)	N.G.R.	Period of Record
Boxworth	44m	TL 346640	1951-70
Burlingham	27m	TG 373101	1950-70
Cambridge, Botanic Gardens	12m	TL 456572	1941-47;1951-70
Cardington	29m	TL 081464	1953-70
Clacton-on-Sea	16m	TM 172143	1941-42;1946-70
Cleethorpes	7m	TA 314079	1941-55;1958-70
Cranwell	62m	TF 003494	1941-70 (with breaks) - 25 to 29 years complete records
Cromer	54m	TG 208422	1941-69
Dovercourt	3m	TM 242301	1957-70
Earls Colne	4m	TL 858288	1941-70 (with breaks) - 25 to 29 years complete records
East Bergholt	4m	TM 077333	1953-70
Garston	78m	TL 123017	1954-70
Gorleston	4m	TG 534037	1941-70
Hoddesdon	47m	TL 369106	1959-70
Kingston-upon-Hull	2m	TR 084302	1941-70
Lincoln	7m	SK 962719	1945-70
Little Parndon	54m	TL 446108	1950-70
Lowestoft	25m	TM 543947	1941-70
Maldon	4m	TL 863065	1941-70
Manby	17m	TF 391869	1952-70
Marham	23m	TF 726094	1951-66;1969-70
Mildenhall	5m	TL 683778	1941-69
Nottingham	59m	SK 568395	1941-70
Raunds	59m	SP 991721	1941-70
Rothamsted	128m	TL 132134	1941-70
St Albans	83m	TL 182076	1941-70
Santon Downham	24m	TL 813901	1958-70
Shoeburyness	2m	TQ 948857	1941-70
Silsoe	61m	TL 092358	1949-70
Skegness	5m	TF 569631	1941-70
Southend	27m	TQ 900850	1945-70
Sprowston	28m	TG 251123	1941-68

Station	Altitude	N.G.R.	Period of Record
Stansted	32m	TL 531226	1953–70
Sutton Bonington	48m	SK 507261	1941–70
Terrington St Clement	3m	TF 547187	1941–46;1951–70
Waddington	68m	SK 988653	1946–53;1955–70
Wattisham	89m	TM 026514	1959–70
West Raynham	74m	TF 847245	1947–68
Wittering	65m	TF 043026	1947–49;1955–70
Woburn	89m	SP 964358	1941–70
Writtle	32m	TL 677069	1941–70
Wyton	39m	TL 284745	1954–70